

LISTING OF THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method for optimizing a circuit design comprising:
determining real costs for a plurality of first value sets represented as a plurality of real chromosomes, wherein the first values sets comprise a first plurality of circuit configurations associated with the circuit design;

determining speculative costs for a plurality of second value sets represented as a plurality of speculative chromosomes, the speculative chromosomes representing value set variations of the first value sets, wherein the second values sets comprise a second plurality of circuit configurations associated with the circuit design; and

postponing validation of speculative chromosomes by generating subsequent generations of speculative chromosomes and associated speculative costs from parents selected from at least one of the plurality of real chromosomes and the plurality of speculative chromosomes, until a predetermined validation criteria has been satisfied.

2. (Currently Amended) The method of claim 1, determining real costs for at least one speculative chromosome of the plurality of speculative chromosomes when the predetermined validation criteria has been satisfied, wherein the real costs are determined by a circuit analysis tool and a power/timing estimator.

3. (Original) The method of claim 1, further comprising assigning a speculation count to each generation of speculative chromosomes, the predetermined validation criteria being a specific speculation count.

4. (Currently Amended) The method of claim 1, the determining real costs comprising executing a real cost function on the plurality of real chromosomes and the

determining speculative costs comprising executing an incremental cost function on the plurality of speculative chromosomes, the incremental cost function determines a speculative cost by approximating a cost effect of an incremental change in a value set of a speculative chromosome relative to a parent chromosome and a cost associated with the parent chromosome.

5. (Original) The method of claim 1, further comprising assigning a real cost to the plurality of real chromosomes based on the minimum cost real chromosome in the plurality of real chromosomes and assigning a speculation cost to each generation of speculative chromosomes based on the minimum cost speculative chromosome in a respective generation.

6. (Original) The method of claim 5, the predetermined validation criteria comprises a speculative cost difference between a generation of speculative chromosomes and a subsequent generation of speculative chromosomes exceeding a predetermined cost change limit.

7. (Original) The method of claim 5, the predetermined validation criteria comprises a cost difference between a generation of speculative chromosomes and the plurality of real chromosomes exceeding a predetermined cost change limit.

8. (Original) The method of claim 1, the predetermined validation criteria comprises speculative costs converging for subsequent generations of speculative chromosomes.

9. (Original) The method of claim 1, the predetermined validation criteria comprises speculation errors associated with each generation of speculation exceeding a predetermined limit.

10. (Original) The method of claim 1, the predetermined validation criteria comprises exceeding an execution time limit for generating subsequent generations of speculative chromosomes and generating speculative costs associated with the subsequent generations.

11. (Currently Amended) A computer-readable medium having computer executable instructions for performing a method comprising:

executing a real cost function on a plurality of first value sets represented as a plurality of real chromosomes to generate a plurality of real costs for each of the plurality of real chromosomes, wherein the first values sets comprise a plurality of circuit configurations associated with a circuit design and the real cost function comprises an analysis tool and a power/timing estimator for generating real costs as a function of power and timing characteristics of the plurality of circuit configurations;

executing a genetic algorithm to generate a plurality of speculative chromosomes, the speculative chromosomes representing value set variations of the first value sets;

executing an incremental cost function on the plurality of speculative chromosomes to generate a plurality of speculative costs for each of the plurality of speculative chromosomes, the incremental cost function determines a speculative cost by approximating a cost effect of an incremental change in a value set of a speculative chromosome relative to a parent chromosome and a cost associated with the parent chromosome; and

repeating execution of the genetic algorithm to produce subsequent generations of speculative chromosomes and repeating execution of the incremental cost function on subsequent generations to provide speculative costs for the subsequent generations of speculative chromosomes, until a predetermined validation criteria has been satisfied.

12. (Original) The method of claim 11, further comprising generating the incremental cost function based on at least one real chromosome and associated real cost.

13. (Currently Amended) The method of claim 11, further comprising validating at least one speculative chromosome of the plurality of speculative chromosomes when the predetermined validation criteria has been satisfied, the validating at least one speculative

chromosome comprising executing the real cost function on the at least one speculative chromosome to generate a real cost associated with the at least one speculative chromosome.

14. (Original) The method of claim 13, further comprising repeating the execution of the genetic algorithm to generate a plurality of new speculative chromosomes from the at least one validated speculative chromosome and executing a new incremental cost function on the plurality of new speculative chromosomes to generate a plurality of speculative costs for each of the plurality of new speculative chromosomes.

15. (Original) The method of claim 11, the predetermined validation criteria is based on at least one of satisfying a speculative chromosome generation count, exceeding a predetermined cost change limit between speculative generations and exceeding a predetermined cost change limit between the plurality of real chromosomes and a speculative generation.

16. (Currently Amended) A system comprising:
a real cost function that generates real costs for each of a plurality of value sets represented as a plurality of real chromosomes, wherein the real cost function comprises an analysis tool for optimizing a circuit design and a power/timing estimator, and the plurality of value sets being a plurality of circuit configurations generated by the analysis tool;
an incremental cost function that generates a plurality of speculative costs corresponding to a plurality of value set variations of at least one of the plurality of real chromosomes, the plurality of value set variations represented as a plurality of speculative chromosomes, the incremental cost function determines a speculative cost by approximating a cost effect of an incremental change in a value set of a speculative chromosome relative to a parent chromosome and a cost associated with the parent chromosome; and
a validator that initiates a validation on at least one speculative chromosome upon satisfaction of a predetermined validation criteria, a validation comprising executing the real cost

function on the at least one speculative chromosome to generate a real cost associated with at least one speculative chromosome.

17. (Original) The system of claim 16, further comprising a genetic algorithm that generates the plurality of speculative chromosomes from parent chromosomes selected from the real chromosomes.

18. (Original) The system of claim 17, the genetic algorithm generates at least one subsequent generation of speculative chromosomes employing parents chromosomes selected from at least one of real chromosomes and speculative chromosomes.

19. (Cancelled)

20. (Original) The system of claim 16, the predetermined validation criteria is based on at least one of satisfying a speculative chromosome generation count, exceeding a predetermined cost change limit between speculative generations and exceeding a predetermined cost change limit between the plurality of real chromosomes and a speculative generation.

21. (Currently Amended) A system for minimizing a cost associated with a ~~set of parameters representing a solution~~circuit design, the system comprising:

means for determining real costs associated with a plurality of real chromosomes representing different value sets associated with a set of parameters, wherein the values sets comprise a plurality of circuit configurations associated with the circuit design;

means for generating a plurality of speculative chromosomes from parent chromosomes selected from at least one of the plurality of speculative chromosomes and the plurality of real chromosomes;

means for determining a speculative cost for a respective speculative chromosome based on a cost of at least one parent chromosome and a cost effect based on a difference in value sets of the at least one parent chromosome and the respective speculative chromosome; and

means for postponing validation of the plurality of speculative chromosomes until a predetermined validation criteria has been satisfied.

22. (Original) The system of claim 21, the means for generating speculative chromosomes being operative to generate additional generations of speculative chromosomes from parents selected from the at least one of the plurality of speculative chromosomes and the plurality of real chromosomes.

23. (Original) The system of claim 21, the predetermined validation criteria is based on at least one of satisfying a speculative chromosome generation count, exceeding a predetermined cost change limit between speculative generations and exceeding a predetermined cost change limit between the plurality of real chromosomes and a speculative generation.

24. (Original) The system of claim 21, validation of the plurality of speculative chromosomes comprising executing the means for determining a real cost on at least one speculative chromosome.